

Fact Sheet

September 2011

Northwest federal agencies prepare for a changing climate

There is growing evidence that global and regional climates are changing. These climate changes are expected to impact the Northwest and, in particular, the Columbia River Basin.

The most significant impact of climate change in the Columbia River Basin may not be the amount of precipitation that falls but rather when and how it will be delivered as streamflow. Warmer temperatures will result in less snow and more rain in the winter, increasing river flows in the winter and early spring, and reducing them in the summer. This will impact how the Columbia River and its tributaries will be managed for flood control, power generation and the protection of fish listed under the Endangered Species Act.

Federal agencies conduct climate change study

The U.S. Army Corps of Engineers, the Bureau of Reclamation and the Bonneville Power Administration began a climate change initiative in 2008 that called for the development of common and consistent climate change data for use in the three agencies' long-term planning activities. That initiative has now produced a final climate change summary report that identifies how climate change could impact hydrology and water supplies in the Columbia River Basin. It also identifies how climate change could impact the operation of the Columbia River and its tributaries.

Summary of Key Findings

TEMPERATURE: Northwest air temperatures are expected to increase by 1 to 3 degrees Fahrenheit (approximately .05 to less than 2 degrees Celsius)



from 2010 to 2039 and by 2 to 5 degrees Fahrenheit (approximately 1 to less than 3 degrees Celsius) from 2030 to 2059.

PRECIPITATION: Overall yearly precipitation changes in the study were minimal. However, some of the global climate models showed large seasonal changes, including more extreme wet and dry periods, some wetter falls and winters, and some drier summers.



SNOW PACK: More winter precipitation would fall as rain instead of snow, producing more runoff in the winter, earlier runoff in the spring and less in the summer.

ANNUAL WATER RUNOFF: During the winter/early spring period of January to April, the runoff amounts for the years 2010 to 2039 ranged from 108 to 150 percent of normal for unregulated flows at The Dalles Dam. Unregulated flow would describe river flow as if there were no dams on the river. For years 2030 to 2059, the runoff amounts ranged from 95 to 170 percent.

During the summer period of June to August, the runoff amounts for years 2010 to 2039 ranged from 80 to 95 percent of normal for unregulated flows and 65 to 95 percent for years 2030 to 2059. Normal flow, or the simulated historical reference climate period, is the average of flows from 1929 to 1998.

Higher January through April flows would generate more hydropower and produce more spill at most dams. Hydropower production would decline at the same time increased temperatures drive greater summer power use.

TRIBUTARY IMPACTS: In the Yakima, Deschutes, and Snake rivers, season-specific impacts on water supply were observed. Reservoir system inflow increased during the cool season (November through March) and decreased during the warm season (April through September). The increase in cool-season system inflow led to an increase in typical cool-season water storage at the beginning of April. However, during the warm season, reductions in the total water supply available led to a greater reliance on stored water resulting in a decline in end-of-month water storage volumes by the end of the summer. A shift in the timing of the peak inflow also was observed in some reservoirs on the tributaries. That shift showed peak inflow occurring one to two months earlier than historical timing.

FLOOD RISK MANAGEMENT: Flood risk management procedures will need to anticipate that runoff may come weeks earlier, shifting the peak runoff from June to May. Earlier releases of water from reservoirs at the flood risk management projects may be needed to capture the early runoff. Impacts to the timing of federal hydro system operations could also impact other spring and summer objectives such as flows for fish.

ENERGY CONSUMPTION: Higher temperatures in the summer will result in more energy use to cool homes and businesses. Warmer temperatures in the winter will reduce energy use for heating. BPA computed the estimated changes in energy consumption and determined that the demand for federal power from 2010 to 2039 showed increases of 1 to 3 percent in July and decreases of 3 to 4 percent in December.

FISH IMPACTS: The increase in the January through April flows would result in higher generation and increased spill at most dams. The reduced flows during July and August may impact the federal agencies' ability to meet future BiOp objectives, including flow management.

Putting new climate change data to use

The three federal agencies will integrate the new climate change data into their ongoing modeling and planning efforts on a number of topics including:

- The Columbia River Treaty Review
- Flood risk management
- Future fish and wildlife program needs
- Future biological opinions
- ESA and National Environmental Policy Act analyses
- Asset planning for the federal hydro system
- Future energy resource development needs
- Water conservation studies and measures (such as piping canals) that leave more water instream for fish.
- Tributary and watershed habitat improvement projects

The 2008 FCRPS Biological Opinion and climate change

The 2008 Federal Columbia River Power System Biological Opinion, a 10-year plan to mitigate for adverse effects of the hydro system on the fish listed under the Endangered Species Act, recognized increased warming over the last century and assumed that warming will continue over the next century. The BiOp also incorporates the Independent Science

Advisory Board's recommendations for reducing future climate change impacts on salmonids.

For more information

The three federal agencies produced the “Climate and Hydrology Datasets for Use in the River Management Joint Operating Committee Agencies’ Longer-Term Planning Studies – Part IV Summary” that recaps the findings of three technical reports that identify potential impacts of climate change on the federal hydro system. The three earlier reports include:

- **Part I: Future Climate and Hydrology Datasets:** Adoption of a consistent set of future climate and hydrologic data from the Climate Impacts Group (December 2010)
- **Part II: Reservoir Operations assessment – Reclamation Tributary Basins:** Climate change impacts to the Reclamation projects on the Yakima, Deschutes and upper Snake River subbasins (January 2011)



- **Part III: Reservoir Operations Assessment – Columbia Basin Flood Control and Hydrology Report:** Projections of future reservoir elevations, outflows, power generation and spill for each of the climate change scenarios developed (June 2011)

Go online

To review the final climate change summary report and the three technical reports listed above, visit any of the following climate change websites:

Bonneville Power Administration: www.bpa.gov/power/pgf/HydrPNW.shtml

Bureau of Reclamation: www.usbr.gov/pn/programs/climatechange/index.html

U.S. Army Corps of Engineers: www.nwd.usace.army.mil